SHIVAJI UNIVERSITY, KOLHAPUR - 416 004,
MAHARASHTRA
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शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४, महाराष्ट्र
दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्याससमंडळे विभाग दुरध्वनी विभाग ०२३१—२६०९०९३/९४

Estd. 1962
"A++" Accredited by
NAAC(2021)
With CGPA 3.52

SU/BOS/Sci & Tech/522 **Date: 13/07/2023**

To,

The Principal,
Dr. A. D. Shinde C ollege of Engineering,
Bhadgaon, Tal. Gadhinglaj,
Dist. Kolhapur

Subject: Regarding New syllabi of **B. Tech. Programme (Branch) Part II (Sem III –IV) Electronics Engineering & Technology (Electronics & Computer Science Engineering)** under Faculty of Science & Technology

Sir/Madam,

With reference to the subject mentioned above, I am directed to in form you that the university authorities have accepted and granted approval to the revised of **B. Tech. Programme (Branch)Part II (Sem III –IV) Electronics Engineering & Technology (Electronics & Computer Science Engineering)** under Faculty of Science & Technology.

This syllabus and equivalence shall be implemented from the academic year 2023-2024 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in. (Online Syllabus)

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dr. S. M. Kubal
Dy. Registrar

Copy to:

1	The Dean, Faculty of Science & Technology	7	Computer Centre (IT)
2	The Chairman, Respective Board of Studies	8	Affiliation Section (T.1)
3	Director, Examination and Evaluation	9	Affiliation Section (T.2)
4	Eligibility Section	10	P.G.Admission Section
5	O.E. – 4	11	P.G Seminar Section
6	Appointment Section	12	Meeting Section

SHIVAJI UNIVERSITY, KOLHAPUR

SYLLABUS AND STRUCTURE

SECOND YEAR (B. Tech.)

Electronics & Computer Science Engineering.

To be introduced from the academic year 2023-24

(i.e., from June 2023) onwards

Semester III

Sr. No	Code No.	Subject	Semester	Credits
1	BSC-ECS-301	Engineering Mathematics – III	3	4
2	PCC-ECS-301	Electronic Devices	3	5
3	PCC-ECS-302	Digital Electronics	3	4
4	PCC-ECS-303	Data Structures and Algorithms	3	4
5	PCC-ECS-304	Database Management System	3	4
6	PCC-ECS-305	Programming in C	3	3
		Total		24

Semester IV

Sr. No	Code No.	Subject	Semester	Credits
1	PCC-ECS-401	Electronic Circuits	4	4
2	PCC-ECS-402	Controls and Instrumentation	4	4
3	PCC-ECS-403	Computer Network	4	4
4	PCC-ECS-404	Microprocessors and Microcontrollers	4	4
5	PCC-ECS-405	Discrete Structure & Automata Theory	4	4
6	PCC-ECS-406	Programming in C++	4	3
7	MC-ECS-401	Environment Studies	4	3
		Total		26

*****For Theory CIE 30 Marks,**

Two tests of 30 marks at college should be conducted and best of two marks should be communicated to university.

*****Guidelines to paper setter:**

In theory ESE examination of 70 marks following pointes should be considered,

1. First question of 10 marks should be allotted to Objective type questions.
2. In Remaining 60 marks, four questions of 15 marks should be considered.

SECOND YEAR ELECTRONICS & COMPUTER SCIENCE ENGINEERING – CBCS PATTERN

Semester Examination

Sr. No	Course (Subject Title)	TEACHING SCHEME									EXAMINATION SCHEME										
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL			TERM WORK		
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	Min	Hours	Max	Min	Hours	Max	Min
SEMESTER III																					
1	BSC-ECS-301	3	3	3	1	1	1	-	-	-		CIE	30	100	40	As per BOS Guidelines	-	-		25	10
												ESE	70								
2	PCC-ECS-301	4	4	4	-	-	-	1	2	2		CIE	30	100	40		-	-		25	10
												ESE	70								
3	PCC-ECS-302	3	3	3	-	-	-	1	2	2		CIE	30	100	40		50	20		25	10
												ESE	70								
4	PCC-ECS-303	3	3	3	1	1	1					CIE	30	100	40		-	-		25	10
												ESE	70								
5	PCC-ECS-304	3	3	3	-	-	-	1	2	2		CIE	30	100	40		50	20		25	10
												ESE	70								
6	PCC-ECS-305	2	2	2	-	-	-	1	2	2		-	-	-	-		50	20		25	10
	TOTAL	**18**	**18**	**18**	**2**	**2**	**2**	**4**	**8**	**8**				**500**			**150**			**150**	
SEMESTER IV																					
1	PCC-ECS-401	3	3	3	-	-	-	1	2	2		CIE	30	100	40	As per BOS Guidelines	50	20		25	10
												ESE	70								
2	PCC-ECS-402	3	3	3	-	-	-	1	2	2		CIE	30	100	40					25	10
												ESE	70								
3	PCC-ECS-403	3	3	3	-	-	-	1	2	2		CIE	30	100	40		50	20		25	10
												ESE	70								
4	PCC-ECS-404	3	3	3	-	-	-	1	2	2		CIE	30	100	40		-	-		25	10
												ESE	70								
5	PCC-ECS-405	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-		-	-
												ESE	70								
6	PCC-ECS-406	2	2	2	-	-	-	1	2	2							50	20		50	20
7	MC-ECS-401	2	2	-	1	1	1	-	-	-		CIE	30	100	40		-	-		-	-
												ESE	70								
	TOTAL	**19**	**19**	**19**	**2**	**2**	**2**	**5**	**10**	**10**				**600**			**150**			**150**	
	TOTAL	**37**	**37**	**37**	**4**	**4**	**4**	**9**	**18**	**18**				**1100**			**300**			**300**	

CIE- Continuous Internal Evaluation. ESE – End Semester Examination

• Candidate contact hours per week: 30 Hours (Minimum)	• Total Marks for S.E. Sem III & IV: 1700
• Theory and Practical Lectures: 60 Minutes	• Total Credits for S.E. Sem III & IV: 50
• In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE.	
• There shall be separate passing for theory and practical (term work) courses.	

Note:

1. **BSC-ECS**: Basic Science Course- Electronics & Computer Science Engineering are compulsory.

2. **PCC-ECS:** Professional Core course –Electronics & Computer Science Engineering are compulsory.

3. **MC-ECS:** Mandatory Course: Environmental Studies which is compulsory for theory 70 marks and project work 30 marks.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

MATHEMATICS-III

Course Details

Class	S. Y. B. Tech Sem - III
Course Code and Course Title	BSC-ECS-301- Engineering Mathematics - III
Prerequisites	Basic Trigonometry, Derivative and Integration, Basic Probability.
Teaching scheme: Lecture /Practical/Tutorial	3/0/1
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: 01Hr/week	TW: 25 Marks

Objectives:

The course is aimed

1. To develop mathematical skills and enhance thinking power of students

2. To give the knowledge to the students of fuzzy set theory, Linear Differential Equations probability, Laplace transforms, Fourier series with an emphasis on the application of solving engineering problems

3. To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.

Course Outcomes:

On successful completion of course learner will be able to;

1. Make use of Linear Differential Equations to solve the Electrical Engineering problems.

2. Apply knowledge of vector differentiation to find directional derivatives, curl and divergence of vector fields.

3. Define fuzzy sets using linguistic words and represent these sets by membership functions, convexity, Normality, support, etc.

4. Develop Fourier series expansion of a function over the given interval.

5. Find Laplace transforms of given functions and use it to solve linear differential equations.

6. Solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions.

Section - I

UNIT NO	CONTENTS	HOURS
1	**Linear Differential Equations (LDE) and its applications:** 1.1 Linear Differential equations with constant coefficients. 1.2 Rules to find complementary function. 1.3 Methods to find particular Integral (e^{ax}, sinax or cosax, x^m, e^{ax}sinax or e^{ax}cosax. 1.4 Cauchy's homogeneous linear differential equations. 1.5 Applications of linear differential equations with constant coefficients to Electrical engineering	7
2	**Vector Differential Calculus:** 2.1 Differentiation of vectors. 2.2 Gradient of scalar point function. 2.3 Directional derivative. 2.4 Divergence of vector point function. 2.5 Curl of a vector point function. 2.6 Irrotational, Solenoidal and Scalar potential function of a vector field.	7
3	**Introduction to Fuzzy sets:** 3.1 Crisp set and Fuzzy set. 3.2. Basic concepts of fuzzy sets 3.3 Basic operations on fuzzy sets. 3.4 Properties of fuzzy sets.	7
Section-II		
4	**Fourier Series:** 4.1 Introduction. 4.2 Definition, Euler's formulae. 4.3 Dirichlet's conditions. 4.4 Change of interval. 4.5 Expansions of odd and even functions. 4.6 Half range series.	7
5	**Laplace Transform and its Applications:** 5.1 Laplace transform of elementary functions. 5.2 Properties of Laplace transforms (First Shifting, Change of scale property, Multiplication & Division by t). 5.3 Laplace transforms of derivatives and integral. 5.4 Inverse Laplace transforms by partial fractions & convolution theorem. 5.5 Solution of Linear differential equation with constant coefficients using Laplace transform.	7
6	**Probability Distribution:** 6.1 Random variables. 6.2 Discrete Probability distribution. 6.3 Continuous probability distribution.	7

	6.4 Binomial Distribution. 6.5 Poisson Distribution. 6.6 Normal Distribution.	
Total		42

Text Books:

01 Higher Engineering Mathematics, by B. S. Grewal (Khanna Publication Delhi.)

02 Applied Mathematics Wartikar P N and Wartikar J N, (Pune Vidyarthi Grah Prakashsn)

Reference Books:

01 Advance Engineering Mathematics by Erwin Kreyszig (Wiley India.)

02 Mathematical Methods of Science and Engineering, by Kanti B. Datta (Cengage Learning.)

03 Advanced Engineering Mathematics, 3e, by Jack Goldberg (Oxford University Press.)

04 Engineering Mathematics by V. Sundaram (Vikas Publication.)

05 Higher Engineering Mathematics, by B. S. Grewal (Khanna Publication Delhi.)

06 Higher Engineering Mathematics, by B. V. Ramana (Tata McGraw-Hill)

07 Advanced Engineering Mathematics, by H. K. Das (S. Chand Publication.)

08 Fuzzy Sets and Fuzzy Logic: Theory and Applications, by George J. Klir and Bo Yuan (Prentice Hall of India Private Limited.)

09 Applied Mathematics by Navneet D. Sangle (Cengage Publication)

General Instructions:

1)For the term work of 25 marks, batch wise tutorials are to be conducted. The number of students per batch per tutorial should be as per university rules.

2)Number of assignments should be at least six (All units should be covered).

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Electronics Devices

Course Details

Class	S. Y. B. Tech Sem - III
Course Code and Course Title	PCC-ECS-301- Electronics Devices
Prerequisites	Basic Circuit Law's, Semiconductor diode, Zener diode, BJT details.
Teaching scheme: Lecture /Practical/Tutorial	4/1/0
Credits	4+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 04Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02Hrs/week	ESE: NA

Course Objectives:

1. To deliver the knowledge of basic semiconductor devices.

2. To enhance comprehension capabilities of students through understanding of electronic devices.

3. To introduce and motivate students to the use of advanced nano electronic devices

4. To analyses amplifiers using BJT and FET based devices.

Course Outcomes:

After successful completion of the course students will be able to:

1. Explain the working of semiconductor devices.

2. Interpret the characteristics of semiconductor devices.

3. Analyze Electronics circuits using BJT and FET (DC & AC analysis)

4. Compare various biasing circuits &configurations of BJT and MOSFETs.

5. Select best circuit for the given specifications/application.

6. Describe the working of advanced nano electronic devices

Section-I

Unit	CONTENTS	Hours
1	**P-N Junction Diode & Applications** 1.1 Theoretical description of basic structure & construction, symbol, operation under zero bias, forward bias & reverse bias, avalanche breakdown, V-I characteristics & temperature effects (no mathematical analysis or numerical examples) 1.2 Application of P-N junction diode as clippers & clampers (different types of configurations with input-output waveforms & transfer characteristics; theoretical description & analysis of each circuit; numerical examples)	6
2	**Special Semiconductor Devices** 1.1 Zener diode as the voltage regulator (theoretical description only which includes construction of circuit diagram, operation / working for varying DC input voltage & varying load resistance, concept of line regulation & load regulation – no numerical examples 1.2 Construction, structure, symbol, operating principle, working & V-I characteristics of special semiconductor devices such as Varactor diode, Schottky diode, Photo diode, Light emitting diode (LED) & Solar cells	6
3	**Bipolar Junction Transistor (BJT)** 3.1 BJT construction & structure, symbol, operation, voltages & currents, V-I characteristics of common emitter (CE), common base (CB) & common collector (CC) configuration, Early effect & concept of leakage current 3.2 DC Circuit Analysis: DC load line, Q-point & region of operation, common BJT configurations, biasing circuits, bias stability and concept of thermal runaway, analysis of biasing circuits (numerical examples to be included) 3.3 AC Analysis of BJT Amplifiers: AC load line, small signal models: h-parameter model, re model, hybrid-pi (rπ) model. AC equivalent circuits and analysis to obtain voltage gain, current gain, input impedance, output impedance of CE amplifier using hybrid-pi (rπ) model only	9
Section-II		
4	**Field Effect Devices (FET)** 4.1 JFET: Construction, symbol, operation, V-I & transfer characteristics MOSFET: Construction, operation, symbol, V-I & transfer characteristics of the DMOSFET & E-MOSFET (theoretical description only for JFET & MOSFET) 4.2 DC Circuit Analysis: DC load line, Q-point & region of operation, common MOSFET configurations of common source (CS), common drain (CD) & common gate (CG), analysis of biasing circuits (numerical examples only for E-MOSFET & D-MOSFET; no JFET) 4.3 AC Analysis: AC load line, small signal (AC) model of the MOSFET & its equivalent circuit, small signal (AC) analysis of common source (CS) configuration MOSFET amplifier only (numerical examples included)	09
5	**Rectifiers &Filters** 5.1 Rectifiers: Working & mathematical analysis of full – wave Centre tapped	06

	rectifier & bridge type rectifier (mathematical analysis include expressions for the DC / average & RMS output voltage, DC / average & RMS output current & ripple factor; numerical examples included) 5.2 Filters: Capacitor (C), Inductor (L), Inductor – Capacitor (LC), C-L-C (π) with circuit diagram, waveforms, working / operation & expression for ripple factor (Theoretical description only – no analysis or numerical examples to be included)	
6	**Emerging Electronic Devices** 6.1 Single Electron Transistor (SET) & Quantum Dots (theoretical description only – construction, structure & nature of operation, characteristics & applications) 6.2 Memristor & Spintronic devices (theoretical description only – construction, structure & nature of operation, characteristics & applications)	06
Total		42

Text Books:

1. Donald A. Neamen, "Electronic Circuit Analysis and Design", TATA McGraw Hill, 2nd Edition
2. Adel S. Sedra, Kenneth C. Smith and Arun N Chandorkar, "Microelectronic Circuits Theory and Applications", International Version, OXFORD International Students Edition, Fifth Edition.
3. James Morris & Krzysztof Iniewski, Nano-electronic Device Applications Handbook by CRC Press

Reference Books:

1. Boylestead," Electronic Devices and Circuit Theory", Pearson Education

2. David A. Bell, "Electronic Devices and Circuits", Oxford, Fifth Edition.

3. Muhammad H. Rashid, "Microelectronics Circuits Analysis and Design", Cengage

4. S. Salivahanan, N. Suresh Kumar,"Electronic Devices and Circuits", Tata McGraw Hill.

5. Millman and Halkies, "Integrated Electronics", Tata McGraw Hill.

List of Experiment: (Minimum 08 Experiments are to be performed.)

1. V-I Characteristics of PN junction diode.
2. V-I Characteristics of photodiode.
3. Study of Clippers & Clampers.
4. Zener diode as a voltage regulator.
5. Study of transistor biasing circuit
6. Study of frequency response of RC coupled amplifier
7. V-I Characteristics of JFET.
8. V-I characteristics of MOSFET.
9. Study of Centre tap Full Wave Rectifier with and without filter
10. Study of Full Wave Bridge Rectifier with and without filter

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Digital Electronics

Course Details

Class	S. Y. B. Tech Sem - III
Course Code and Course Title	PCC-ECS-302- Digital Electronics
Prerequisites	Number system, Basic Gates.
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02Hrs/week	ESE: 50 Marks

Course Objectives:

1. To understand various number systems &codes and to introduce students to various logic gates, SOP, POS form and their minimization techniques
2. To teach the working of combinational circuits, their applications and implementation of combinational logic circuits using MSI chips.
3. To teach the elements of sequential logic design, analysis and design of sequential circuits.
4. To understand various counters and shift registers and its design using MSI chips.
5. To explain and describe various logic families and Programmable Logic Devices.
6. To train students in writing programs with Verilog hardware description languages.

Course Outcomes:

After successful completion of the course students will be able to

1. Perform code conversion and able to apply Boolean algebra for the implementation and minimization of logic functions.
2. Analyze, design and implement Combinational logic circuits.
3. Analyze, design and implement Sequential logic circuits.
4. Design and implement various counter using flip flops and MSI chips.
5. Understand TTL & CMOS logic families, PLDs, CPLD and FPGA

6. Understand basics of Verilog Hardware Description Language and its programming with combinational and sequential logic circuit

Section-I

Unit	CONTENTS	Hours
I	**Fundamentals of Digital Design**	07
	1.1 Number Systems and Codes: Review of Number System, Binary Code, Binary Coded Decimal, Octal Code, Hexadecimal Code and their conversions, Binary Arithmetic: One's and two's complements,	
	1.3 **Codes**: Excess-3 Code, Gray Code, Weighted code, Parity Code: Hamming Code	
	1.4 **Logic Gates and Boolean Algebra**: Digital logic gates, Realization using NAND, NOR gates, Boolean Algebra, De Morgan's Theorem, SOP and POS representation, K Map up to four variables	
2	**Combinational Circuits using basic gates as well as MSI devices**	07
	2.1Arithmetic Circuits: Half adder, Full adder, Ripple carry adder, Carry Look ahead adder, Half Subtractor, Full Subtractor, multiplexer, cascading of Multiplexer, demultiplexer, decoder, Comparator (Multiplexer and demultiplexer gate level upto 4:1)	
	2.2 MSI devices: IC7483, IC74151, IC74138, IC7485.	
3	**Elements of Sequential Logic Design**	07
	3.1 Sequential Logic: Latches and Flip-Flops. RS, JK, Master slave flip flops, T & D flip flops with various triggering methods, Conversion of flip flops,	
	3.2 Counters: Asynchronous, Synchronous Counters, Up Down Counters, Mod Counters, Ring Counter, Twisted ring counter, Shift Registers, Universal Shift Register.	
Section-II		
4	**Sequential Logic Design:**	07
	4.1 Sequential Logic Design: Mealy and Moore Machines, clocked synchronous state machine analysis, state reduction techniques (inspection, partition and implication chart method) and state assignment, sequence detector, Clocked synchronous state machine design.	
	4.2 Sequential logic design practices: MSI counters (7490, 7492, 7493,74163, 74169) and applications, MSI Shift registers (74194) and their applications	
5	**Logic Families and Programmable Logic Devices**	06
	5.1 **Logic Families:** Types of logic families (TTL and CMOS), characteristic parameters (propagation delays, power dissipation, Noise Margin, Fan-out and Fan-in), transfer characteristics of TTL NAND (Operation of TTL NAND gate), CMOS Logic: CMOS inverter, CMOS NAND and CMOS NOR, Interfacing CMOS to TTL and TTL to CMOS.	
	5.2 **Programmable Logic Devices**: Concepts of PAL and PLA. Simple logic implementation using PAL and PLA, Introduction to CPLD and FPGA	

	architectures, Numerical based on PLA and PAL	
6	**Introduction to Verilog HDL**	08
	6.1Basics: Introduction to Hardware Description Language and its core features, synthesis in digital design, logic value system, data types, constants, parameters, wires and registers. Verilog Constructs: Continuous & procedural assignment statements, logical, arithmetic, relational, shift operator, always, if, case, loop statements, Gate level modelling, Module instantiation statements	
	6.2 Modelling Examples: Combinational logic e g. Arithmetic circuits, Multiplexer, Demultiplexer, decoder, Sequential logic e g. flip flop, counters.	
Total		42

Text Books:

1. R. P. Jain, Modern Digital Electronics, Tata McGraw Hill Education, Third Edition 2003.
2. Morris Mano, Digital Design, Pearson Education, Asia 2002.
3. J. Bhaskar, A Verilog HDL Primer, Third Edition, Star Galaxy Publishing, 2018.

Reference Books:

1. Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006
2. John F. Warkerly, Digital Design Principles and Practices, Pearson Education, Fourth Edition, 2008.
3. Stephen Brown and Zvonko Vranesic, Fundamentals of digital logic design with Verilog design, McGraw Hill, 3rd Edition.
4. Digital Circuits and Logic Design – Samuel C. Lee, PHI
5. William I. Fletcher, "An Engineering Approach to Digital Design", Prentice Hall of India.
6. Parag K Lala, "Digital System design using PLD", BS Publications, 2003.
7. Charles H. Roth Jr., "Fundamentals of Logic design", Thomson Learning, 2004.

List of Experiments: (Minimum 08 Experiments are to be performed.)

1. Verification and interpretation of truth table for AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates
2. Realization of logic functions with the help of Universal Gates (NAND, NOR)
3. Verification of De Morgans theorem.
4. To Study and Verify Half and Full adder.
5. To Study and Verify Half and Full Subtractor
6. Verify the truth table of RS & JK flip-flops using NAND and NOR gates
7. Study of ring counter.
8. Design shift register by using IC 74194.
9. Study of CPLD and FPGA devices.
10. Study of arithmetic logic circuits by using Verilog HDL.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Data Structures and Algorithms

Course Details

Class	S. Y. B. Tech Sem - III
Course Code and Course Title	PCC-ECS-303- Data Structures and Algorithms
Prerequisites	C-Programming
Teaching scheme: Lecture /Practical/Tutorial	3/0/1
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: 01Hr/week	TW: 25 Marks
Practical: NA	ESE: NA

Course Prerequisite:

C Programming

Course Objectives:

1. To understand and demonstrate basic data structures (such as Arrays, linked list, stack, queue, binary tree, graph).
2. To implement various operations on data structures.
3. To study different sorting and searching techniques.
4. To choose efficient data structures and apply them to solve real world problems

Course Outcomes:

After successful completion of the course students will be able to;

1. Implement various linear data structures.
2. Implement various nonlinear data structures.
3. Select appropriate sorting and searching techniques for a given problem and use it
4. Develop solutions for real world problems by selecting appropriate data structure and algorithms.
5. Analyze the complexity of the given algorithms.

Section-I

UNIT	CONTENTS	HOURS
1	**Introduction to Data Structures** Introduction to Data Structures, Types of Data Structures – Linear and Nonlinear, Operations on Data Structures, Concept of array, Static arrays vs Dynamic Arrays, structures. Introduction to Analysis of Algorithms, characteristics of algorithms, Time and Space complexities, Asymptotic notations.	07
2	**Stack and Queues** Introduction, Basic Stack Operations, Representation of a Stack using Array, Applications of Stack – Well form-ness of Parenthesis, Infix to Postfix Conversion and Postfix Evaluation. Queue, Operations on Queue, queue-Round Robin Algorithm.	06
3	**Linked List** Introduction, Representation of Linked List, Linked List v/s Array, Types of Linked List - Singly Linked List (SLL), Operations on Singly Linked List: Insertion, Deletion, reversal of SLL, Print SLL. Implementation of Stack and Queue using Singly Linked List. Introduction to Do Representation of a Queue using array, Circular Queue, concept of priority Queue, Applications of Qubly Linked List and Circular Linked List	08
Section-II		
4	**Trees** Introduction, Tree Terminologies, Binary Tree, Types of Binary Tree, Representation of Binary Trees, Binary Tree Traversals, Binary Search Tree Operations on Binary Search Tree, Applications of Binary Tree – Expression Tree, Huffman Encoding.	07
5	**Graphs** Introduction, Graph Terminologies, Representation of graph (Adjacency matrix and adjacency list), Graph Traversals – Depth First Search (DFS) and Breadth First Search (BFS), Application – Topological Sorting	06
6	**Introduction to Sorting and Searching** Introduction to Searching: Linear search, Binary search, Sorting: Internal VS. External Sorting, Sorting Techniques: Bubble, Insertion, selection, Quick Sort, Merge Sort, Comparison of sorting Techniques based on their complexity. Hashing Techniques, Different Hash functions, Collision & Collision resolution techniques: Linear and Quadratic probing, Double hashing.	08
	Total	42

Text Books:

1.Data Structures Using C, Aaron M Tenenbaum, Yedidyah Langsam, Moshe J Augenstein, Pearson Education

2. Introduction to Data Structure and its Applications Jean-Paul Tremblay, P. G.Sorenson

3. Data Structures using C, Reema Thareja, Oxford

4. C and Data structures, Prof. P.S.Deshpande, Prof. O.G.Kakde, Dreamtech Press.

5. Data Structures: A Pseudocode Approach with C, Richard F. Gilberg& Behrouz A. Forouzan, Second Edition, CENGAGE Learning

Reference Books:

1. Data Structure Using C, Balagurusamy.

2. Data Structures using C and C++, Rajesh K Shukla, Wiley – India

3. ALGORITHMS Design and Analysis, Bhasin, OXFORD.

4. Data Structures Using C, ISRD Group, Second Edition, Tata McGraw-Hill.

5. Computer Algorithms by Ellis Horowitz and Sartaj Sahni, Universities Press.

6. Data Structures, Adapted by: GAV PAI, Schaum's Outline

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Database Management Systems

Course Details

Class	S. Y. B. Tech Sem - III
Course Code and Course Title	PCC-ECS-304 Database Management Systems
Prerequisites	Data Models & mapping
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical:02Hrs/week	ESE: 50 Marks

Course Objectives:

1. Develop entity relationship data model and its mapping to relational model
2. Learn relational algebra and formulate SQL queries
3. Apply normalization techniques to normalize the database
4. Understand concepts of transaction, concurrency control and recovery techniques

Course Outcomes:

After successful completion of the course students will be able to:

1. Recognize the need of database management system
2. Design ER and EER diagram for real life applications
3. Construct relational model and write relational algebra queries.
4. Formulate SQL queries
5. Apply the concept of normalization to relational database design.
6. Describe the concepts of transaction, concurrency and recovery

Section-I

Unit No.	Contents		Hrs.
1		**Introduction to Database Concepts**	07
	1.1	Introduction, Characteristics of databases	
	1.2	File systems v/s Database systems	
	1.3	Data abstraction and Data Independence	
	1.4	DBMS system architecture	
	1.5	Database Administrator	
2		**Entity–Relationship Data Model**	07
	2.1	The Entity-Relationship (ER) Model	
	2.2	Entity types: Weak and strong entity sets, Entity sets, Types of Attributes, Keys	
	2.3	Relationship constraints: Cardinality and Participation	
	2.4	Extended Entity-Relationship (EER) Model: Generalization, Specialization and Aggregation	
3		**Relational Model and Relational Algebra**	07
	3.1	Introduction to the Relational Model	
	3.2	Relational schema and concept of keys	
	3.3	Mapping the ER and EER Model to the Relational Model	
	3.4	Relational Algebra – operators, Relational Algebra Queries.	
Section-II			
4		**Structured Query Language (SQL)**	07
	4.1	Overview of SQL	
	4.2	Data Definition Commands	
	4.3	Integrity constraints: Key constraints, Domain Constraints, Referential integrity, Check constraints	
	4.4	Data Manipulation commands, Data Control commands	
	4.5	Set and string operations, aggregate function - group by, having	
	4.6	Views in SQL, joins, Nested and complex queries, Triggers	
5		**Relational–Database Design**	06
	5.1	Pitfalls in Relational-Database designs	
	5.2	Concept of normalization	
	5.3	Function Dependencies	
	5.4	First Normal Form, 2NF, 3NF, BCNF.	
6		**Transactions Management and Concurrency and Recovery**	08
	6.1	Transaction Concept, Transaction states	
	6.2	ACID properties	
	6.3	Transaction Control Commands	
	6.4	Concurrent Executions	
	6.5	Serializability: Conflict and View	
	6.6	Concurrency Control: Lock-based, Timestamp-based protocols	
	6.7	Recovery System: Log based recovery	
	6.8	Deadlock handling	

	Total	42

Text Books:

1. Korth, Slberchatz, Sudarshan, Database System Concepts, 6th Edition, McGraw Hill

2. Elmasri and Navathe, Fundamentals of Database Systems, 5th Edition, Pearson education

3. Raghu Ramkrishnan and Johannes Gehrke, Database Management Systems, TMH

Reference Books:

1. Peter Rob and Carlos Coronel, Database Systems Design, Implementation and Management‖, Thomson Learning, 5th Edition
2. Dr.P.S. Deshpande, SQL and PL/SQL for Oracle 10g, Black Book, Dreamtech Press
3. G. K. Gupta, Database Management Systems, McGraw Hill., 2012

List of experiments:

1. Draw an E-R Diagram of any organization.
2. Reduce above mentioned E-R Diagram into tables.
3. Normalize any database from first normal form to Boyce-Codd Normal Form (BCNF)
4. Write a program of Database connectivity with any object-oriented language.
5. Create table with integrity constraints like primary key, check, not null and unique.
6. Create table with referential integrity constraints with foreign key, on delete cascade and on delete set null.
7. Display the results of set operations like union, intersections & set difference.
8. Display the results of Join Operations like cross join, self-join, inner join, natural join, left outer join, right outer join and full outer join.
9. Display the records using Aggregate functions like min, max, avg, sum & count. Also use group by, having clauses. 12. Display the results using String operations.
10. Create & Update views for any created table.
11. Study of No Sql.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Programming in C

Course Details

Class	S. Y. B. Tech Sem - III
Course Code and Course Title	PCC-ECS-305 Programming in C
Prerequisites	Data Models & mapping
Teaching scheme: Lecture /Practical/Tutorial	2/1/0
Credits	2+1

Evaluation scheme CIE/ESE for Practical

Teaching scheme	Examination scheme
Lectures: 02Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02Hrs/week	ESE: 50 Marks

Course Objectives:

The course aims to:

1 To understand how to design flowchart and algorithms for procedure-oriented programs.

2 To develop programming skills using the fundamentals and basics of C Language, control structures and looping statements.

3 3 To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

4 4 To design and implement programs using files handling and user defined types.

Course Outcomes:

Upon successful completion of this course

1. Student will be able to understand the basic concepts of procedure-oriented programming language.
2 Student will be able to use the control statements, looping statements and functions concepts.
3 Student will be able to design programs using user defined functions and data type.
4. Student will be able to design & apply the skills for solving the engineering problems.

Course Contents

1. Programming Fundamentals, Flow chart, Algorithm, Standard notations, Selection Procedure, Loops, Sub Algorithms, Compilers, Interpreters, The Library and Linking. 04 Hrs.

2. Introduction to C Introduction to Constants, Variables, Data Types, Operators, Expressions, Structure of C Programming, Identifiers, Decision & Loop control statements. 05 Hrs.

3. Arrays and Structures Arrays: Introduction to 1-Dimensional arrays, Declaration and Initialization of 1-Dimensional arrays, Declaration and Initialization of 2-Dimensional arrays, Declaration and Initialization of Multi-Dimensional arrays. Structures-Declaring of Structures, Accessing Structure elements, arrays of structures. 04 Hrs.

4. Functions and Pointers Introduction of functions, need for functions, Multifunction Programming, Elements of functions, Definition and declaration of functions, return values and their types, function call, arguments, return value, nesting and recursion Pointers- Introduction to pointers, pointer variables, Declaration and initialization of pointer variable, accessing pointer.

05 Hrs.

5. Strings Declaration and Initialization of string, Reading from Terminal, Writing to screen, Standard library string functions. 03 Hrs.

6. File handling File operation, counting character tabs, spaces, file copy program, file opening modes, text file- binary file, Real time case study. 03 Hrs.

Text Books:

1 Let Us C Yashawant Kanetkar, 13th Edition BPB Publications (unit II, VI)

2 Programming in ANSI C , E Balagurusamy, 5th edition, Tata Mc Graw Hill (unit III. IV, V)

Reference Books:

1 The C Programming Language, Brian W. Kernighan, Dennis M. Ritchi , IInd edition, Prentice Hall of India.

List of Experiments (Minimum 10 + mini project):

1. Develop Program using decision control statements
2. Develop Program using control statements
3. Develop Program using loop control statements
4. Develop Program using functions
5. Develop Program using pointers
6. Develop Program using array
7. Develop Program using two dimensional arrays
8. Develop Program using structures
9. Develop Program using dynamic memory allocation
10. Develop Program using strings
11. Develop Program using any sorting technique
12. Develop Program using file handling.
13. Mini project

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

ELECTRONICS CIRCUITS

Course Details

Class	S. Y. B. Tech Sem - IV
Course Code and Course Title	PCC-ECS-401- ELECTRONICS CIRCUITS
Prerequisites	Electronics Devices.
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02 Hrs/week	ESE: 50 Marks

Course Objectives:

1. To enhance comprehension capabilities of students through understanding of electronic circuits.

2. To perform low frequency and high frequency analysis of single stage amplifiers.

3.To teach fundamental principles of operational amplifiers.

4. To develop an overall approach for students from selection of integrated circuit, specification, functionality and applications

Course Outcomes:

After successful completion of the course students will be able to

1. Evaluate the performance of amplifiers through frequency response.

2. Analyse differential amplifiers for various performance parameters

3. Express mathematically the performance parameters in terms of circuit parameters

4. Choose appropriate circuit for the given specifications/ applications

5. Describe various applications and circuits based on operational amplifiers.

6. Design an application with the use of integrated circuits.

Section-I

Unit		CONTENTS	Hours
1		**Frequency Response of Amplifiers**	7
	1.1	Low frequency response & analysis, effect of the coupling, bypass & load capacitances on single stage MOSFET amplifier for common source (CS)configuration (mathematical analysis & numerical examples included)	
	1.2	High frequency response & analysis, effect of parasitic capacitances on MOSFET amplifier, high frequency equivalent circuit of MOSFET, Miller's theorem, effect of Miller's capacitance, unity gain bandwidth (mathematical analysis & numerical examples included)	
	1.3	Introduction to multi-stage amplifiers – need & necessity, different types of couplings (DC, R-C & transformer) with advantages & disadvantages, the MOSFET cascade amplifier (theoretical description only)	
2		**Differential Amplifiers**	7
	2.1	Basic MOSFET differential amplifier, DC characteristics, transfer characteristics, small signal (AC) analysis of only dual input balanced output (DIBO) for differential mode gain & common mode gain, common mode rejection ratio (CMRR) & input resistance / impedance	
	2.2	MOSFET differential amplifier with an active load (theoretical description & only mathematical analysis – no numerical examples)	
3		**Operational Amplifiers**	7
	3.1	The ideal operational amplifier (op-amp), internal block diagram of op-amp, characteristics of op-amp, ideal & practical op-amp parameters / specifications (no detailed description or any analysis), mathematical model of op-amp, IC 741 op-amp with pin diagram & description	
	3.2	Operational amplifier open loop & closed loop configurations (theoretical description only), the concept of virtual ground & virtual short	
Section-II			
4		**Applications of Operational Amplifier**	8
	4.1	Types of negative feedback – voltage series, voltage shunt, current series & current shunt (theoretical description only), the op-amp inverting amplifier & op-amp noninverting amplifier (mathematical analysis for derivation of output voltage only, numerical examples & designing)	
	4.2	Adder, summing amplifier, averaging circuit, subtractor, integrator (ideal), differentiator (ideal), difference amplifier, current amplifier & 3 op-amp instrumentation amplifier (only mathematical analysis for derivation of output voltage with numerical examples & designing included)	
	4.3	Current to voltage converters (I to V) & voltage to current converters (V to I) – floating load & grounded load (mathematical analysis only – no numerical)	
5		**Oscillators &Comparators**	7
	5.1	Oscillators: RC phase shift oscillator, Wien bridge oscillator & the crystal oscillator (theoretical description only – no mathematical analysis), numerical example & design problem on RC phase shift oscillator & Wien bridge oscillator	
	5.2	Waveform Generators: Square wave generator & triangular wave generator	

		(only theoretical description – no mathematical analysis or designing examples)	
	5.3	Comparators: Inverting comparator, non-inverting comparator, zero crossing detector (ZCD) & Schmitt Trigger (numerical examples & designing problem on the inverting Schmitt Trigger for both symmetrical & non-symmetrical configurations), window detector / comparator (theoretical description only)	
6		**Special Purpose Integrated Circuits**	6
	6.1	IC 555 timer internal block diagram & pin configuration, operation in astable & monostable multivibrator with mathematical analysis & numerical examples, design problems on astable & monostable multivibrator, applications in astable& monostable configuration	
	6.2	ADC 0808 / 0809 & interfacing, DAC0808 & interfacing (theoretical description only	
	6.3	Functional block diagram & working of the LT 1070 monolithic switching regulator (theoretical description only)	
		Total	42

Text Books:

1.Donald A. Neamen, “Electronic Circuit Analysis and Design”, TATA McGraw Hill,

2nd Edition. 2.Ramakant A. Gayakwad, “Op-Amps and Linear Integrated Circuits”, Pearson Prentice Hall, 4th Edition.

Reference Books:

1. Robert Boylestad," Electronic Devices and Circuit Theory", Pearson.

2.David A. Bell,“Electronic Devices and Circuits”, Oxford, Fifth Edition.

3. Muhammad H. Rashid, “Microelectronics Circuits Analysis and Design”, Cengage

4. S. Salivahanan, N. Suresh Kumar,“Electronic Devices and Circuits”, Tata McGraw Hill.

5. D. Roy Choudhury and S. B. Jain, “Linear Integrated Circuits”, New Age International Publishers, 4th Edition.

6. Sergio Franco, “Design with operational amplifiers &analog integrated circuits”, Tata McGraw Hill, 3rd edition

7. William D. Stanley, “Operational Amplifiers with Linear Integrated Circuits”, Pearson, 4th Edition.

List of experiments:

1. Study of operational amplifier.
2. Design of inverting, non-inverting amplifier & their frequency response.
3. Design of Summing amplifier.
4. Design, build and test precision half & full wave rectifier.
5. Design, build and test Comparator and Schmitt trigger.
6. Design of Butterworth filters.
7. Design, build and test square wave generator.
8. Design, build and test triangular wave generator.
9. Design, build and test Integrator.
10. Design, build and test Differentiator.
11. Design and implement oscillator using Op-Amp.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

CONTROLS & INSTRUMENTATION

Course Details

Class	S. Y. B. Tech Sem - IV
Course Code and Course Title	PCC-ECS-402- Controls & Instrumentation
Prerequisites	Applied Maths, Applied Physics, Basic Electrical Engineering.
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02 Hrs/week	ESE: NA

Course Objectives:

1. To develop the ability to model control systems and determine their time response and frequency response.

2. To develop the ability to analyse stability of control systems.

3. To develop the ability to understand instruments and data acquisition systems.

Course Outcomes:

After successful completion of the course students will be able to

1. Derive the transfer functions for the given control systems.

2. Analyse the performance of control systems based on the time domain and frequency domain specifications.

3. Judge the stability of the given control systems using appropriate stability criteria.

4. Understand and explain the working principle of sensors and transducers.

5. Explain various parameters of data acquisition systems. 6. Describe instrument communication standards.

Section-I

Unit		CONTENTS	Hours
1		**Introduction to Control Systems and Mathematical Models**	7
	1.1	Introduction to control systems: The control system, servomechanisms, digital control.	
	1.2	Mathematical models: Transfer functions, block diagram algebra, block diagram reduction, signal flow graphs.	
2		**Time response analysis and stability analysis in time domain**	7
	2.1	Time response analysis: standard test signals, time response of first and second order systems, steady state errors and error constants.	
	2.2	Stability in time domain: The concept of stability, necessary conditions for stability, Hurwitz stability criterion, Routh stability criterion, relative stability analysis.	
	2.3	Stability analysis using root locus technique.	
3		**Stability Analysis in frequency domain and Introduction to advances in control systems**	7
	3.1	Introduction to frequency response analysis, correlation between time and frequency domain.	
	3.2	Stability analysis using Bode plots.	
	3.3	Nyquist stability criterion and stability analysis using Nyquist plot.	
	3.4	Introduction to advances in control systems: adaptive control, fuzzy logic control and neural networks. Introduction to distributed control systems.	
Section-II			
4		**Sensors and Transducers**	8
	4.1	Introduction to sensors and transducers. Various types of sensors. Various types of transducers and their principle of operation. Selection criteria of transducers.	
	4.2	Displacement and pressure transducers: potentiometers, pressure gauges, Linear variable differential transducer (LVDT), strain gauges.	
	4.3	Temperature transducers: working principle, ranges and applications of resistance temperature detectors (RTD), thermocouple and thermistor temperature transducers.	
5		**Signal conditioning DAS, Data logger and SCADA**	7
	5.1	Introduction to instrumentation systems, data acquisition system (DAS), use of DAS in Intelligent instrumentation system. Design of pressure and temperature measurement system using DAS. Data logger, its types and applications. SCADA communication architecture, types, applications, open SCADA protocols. Cloud based SCADA systems. Introduction to fibre optic instrumentation.	
6		**Telemetry and Instrument communication standards**	6
	6.1	Introduction to telemetry, landline telemetry, radio telemetry and types of multiplexing.	
	6.2	Instrument interfacing, Current loop, RS232/485, Field bus, Modbus, GPIB, USB Protocol, and HART communication Protocol.	

Total	42

Text Books:

1. I. J. Nagrath, M. Gopal, "Control System Engineering", 5th edition, New Age International Publishers 2. B. S. Manke, "Linear Control Systems", Khanna Publishers, New Delhi.

3. D. Patranabis, "Principle of Industrial Instrumentation", Tata McGraw Hill.

4. A.K. Sawhney, "Electrical & Electronic Measurement & Instrumentation" – DRS. India

5. H.S.Kalsi, "Electronic Instrumentation"-TMH, 2nd Edition

Reference Books:

1. K. Ogata, "Modern Control Engineering", PHI, New Delhi

2. Norman S. Nise, "Control System Engineering", John Wiley and Sons.

3. B. C. Kuo, "Automatic Control Systems", PHI, New Delhi

4. C. S. Rangan, G. R. Sharma and V. S. Mani, 'Instrumentation Devices and Systems', Tata McGraw-Hill Publishing Company Ltd.

5. Helfrick & Cooper, "Modern Electronic Instrumentation & Measuring Techniques" – PHI

List of experiments

1. Introduction of MATLAB and control system tool box.
2. Program To find zeros and poles & to Create Transfer Function of given system.
3. Program to study Block Diagram Reduction by using MATLAB.
4. Study of Hurwitz stability criterion.
5. Study of Routh stability criterion
6. Program to perform frequency response analysis of system using Bode diagram.
7. Program to obtain Nyquist plot of given system.
8. Displacement measurement using LVDT.
9. Temperature measurement using RTD.
10. Study of supervisory control and data acquisition system.
11. Study of telemetry.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

COMPUTER NETWORK

Course Details

Class	S. Y. B. Tech Sem - IV
Course Code and Course Title	PCC-ECS-403- Computer Network
Prerequisites	
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02 Hrs/week	ESE: 50 Marks

Course Objectives:

To perceive fundamental concepts of Computer Networks

1. To understand layered architecture and basic networking protocols
2. To illustrate the TCP/IP protocol internal details

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Demonstrate concepts of Computer Networks.
2. Explain OSI and TCP/IP layered architecture
3. Implement network and data link layer.
4. Demonstrate TCP protocol in detail.
5. To analyze the protocol structure using network analyzing tools.
6. apply the principals of socket programming in the networks.

Section 1

Unit		CONTENTS	Hours
1		Introduction to Computer Network:	6
	1.1	Overview of OSI layer Model and TCP/IP protocol model	
	1.2	Addressing, Underlying technologies for LANs	
	1.3	WANs, and Switched WANs	
2		Data Link Layer	6
	2.1	Design issues for Data Link Layers	
	2.2	Framing methods, Error control: detection and correction	
	2.3	Flow control, Elementary Data Link protocols	
	2.4	Sliding window Protocols, Go back n, Selective repeat.	
3		Medium Access Control Sub layer:	6
	3.1	Static and Dynamic channel allocation	
	3.2	Multiple Access protocols ALHOA	
	3.3	CSMA, Collision Free Protocols, Ethernet: IEEE 802.3	
	3.4	IEEE 802.4, IEEE 802.5 standards	
	3.5	Wireless LANS 802.11 standards	
Section-II			
4		Network Layer	7
	4.1	IPv4 Addresses: Classful Addressing Other Issues	
	4.2	Sub-netting and Super netting, Class less Addressing	
	4.3	Delivery, Forwarding and routing	
	4.4	Routing methods: shortest path, Link state, Distance vector routing and broadcast routing	
	4.5	Congestion control algorithms: Principles, Congestion prevention policies	
	4.6	congestion control in datagram subnet, Load Shedding, Jitter Control	
5		Internet Protocol:	8
	5.1	IP Datagram format, Fragmentation and reassembly models, ARP, RARP, ICMP, IGMP.	
6		Transport Layer	8
	6.1	The Transport service primitives	
	6.2	UDP: Process to Process communication, User Datagram Format, Operation and uses of UDP	
	6.3	TCP: TCP Services and Features, TCP segment format, TCP Connections, Flow and error control in TCP	
	6.4	TCP Timers; Berkeley Sockets: Socket Addresses, Elementary Socket system calls byte ordering and address conversion routines	
	6.5	connectionless iterative server, connection oriented concurrent server, TCP and UDP Client server Programs	
Total			42

TEXT BOOKS:

1. TCP/IP protocol suit 4thEd. – Behrouz A. Forouzen (Tata Mag.Hill)

2. Computer Networks – Andrew S. Tanenbaum (PHI)

3. Unix Network Programming – W. Richard Stevens (PHI)

REFERENCE BOOKS:

1. TCP/IP Illustrated, The Protocols, Vol. I – W. Richard Stevens, G. Gabrani (Pearson Education.)

2. Internetworking with TCP/IP, Vol. I Principles, Protocols, and Architectures – D. E. Comer (Pearson Ed.) 3. Internetworking with TCP/IP, Vol. III, Client-Server Programming and Application (2nd Ed.) –D. E. Comer, David L. Stevens (Pearson Ed.)

TERM WORK

1. Study and demo of LAN, WAN and various connecting devices and components • List out component and devices required for a std. LAN, WAN

2. Study, design and configuration of IEEE 802.3 Ethernet and IEEE 802.11Wireless • LANs (Referring RFCs)

3. Study of following connectivity test tools with all its options–

4. ifconfig, arp, route, traceroute

5. nmap, netstat, finger

6. Implementing Framing methods

7. Implementing Elementary data link protocol (Stop & wait protocol)

8. Implementation of Error detection (CRC)code

9. Implementation of Error detection codes (Hamming)

10. Programs to understand IP addressing, classful & classless addressing

11. Implementation of sliding window protocol.

12. Implement shortest path routing algorithm.

13. Programs for connection oriented (TCP) client-server using socket programming

14. Programs for connection less (UDP) client-server using socket programming

15. Study of network protocol analyzer (Ethereal or Wire-Shark) and understanding packet formats for UDP, TCP, ARP, ICMP protocols.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

MICROPROCESSOR & MICROCONTROLLER

Course Details

Class	S. Y. B. Tech Sem - IV
Course Code and Course Title	PCC-ECS-404- Microprocessor & Microcontroller
Prerequisites	Electronics Devices, Digital Electronics
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02 Hrs/week	ESE: NA

Course Objectives:

1. To study the concepts and basic architecture of a Microprocessor and Microcontroller.

2. To write Assembly language programs for Microprocessors and Micro controllers for various applications.

3. To know the importance of different peripheral devices and their interfacing to 8086 and 8051.

4. To build Microprocessor and Microcontroller based systems.

Course Outcomes:

After successful completion of the course students will be able to;

1. Explain 16-bit Microprocessor architectures and fundamental concepts of Microcontrollers

2. To develop programming skills for Microprocessors and Microcontrollers

3. To interface various devices in Microprocessor and Microcontroller systems

4. To design and implement Microprocessor and Microcontroller based systems.

Section I

Unit		CONTENTS	Hours
1		**The 8086 Microprocessor**	7
	1.1	8086 Architecture	
	1.2	Memory Segmentation	
	1.3	8086 pin description	
	1.4	Interrupts and Interrupt service routines, Dedicated interrupts, Software interrupts	
2		**8086 programming**	7
	2.1	Addressing modes	
	2.2	Instruction Set and Assembler Directives	
	2.3	Assembly language programming	
3		**8086 Interfacing –Part I**	7
	3.1	Generating the 8086 System Clock and Reset Signals using 8284 clock generator	
	3.2	8086 Minimum and Maximum Mode CPU Modules	
	3.3	Minimum and Maximum Mode Timing Diagrams	
	3.4	Memory interfacing.	
Section-II			
4		**8086 Interfacing –Part II**	6
	4.1	8255-PPI: Functional Block Diagram and description, Operating Modes	
	4.2	8259- PIC: Functional Block Diagram and description, Cascaded mode of operation	
	4.3	System design (including Memory and I/O)	
5		**The 8051 Microcontroller**	7
	5.1	Differences between a Microprocessor and Microcontroller	
	5.2	Architecture of 8051	
	5.3	Memory Organization of the 8051	
	5.4	Addressing modes	
	5.5	Instruction set	
	5.6	Assembly language programming.	
6		**8051 Interfacing**	8
	6.1	I/O port programming	
	6.2	Programming 8051 Timers	
	6.3	Serial Port Programming	
	6.4	Interrupts Programming	
	6.5	LCD & Keyboard Interfacing	
	6.6	ADC, DAC & Sensor Interfacing	
	6.7	Stepper Motor and DC motor Interfacing	
		Total	**42**

Text Books:

1. 8086/8088 family: Design Programming and Interfacing: By John Uffenbeck (Pearson Education)

2. Microprocessor and Interfacing: By Douglas Hall (TMH Publication)

3. The 8051 Microcontroller and Embedded Systems Using Assembly and C: By M. A. Mazidi, J. C. Mazidi, Rolin D. McKinlay, Pearson Education, 2ndEdition.

4. The 8051 Microcontroller: ByKenneth J. Ayala, Cengage Learning India Pvt. Ltd, 3rdEdition

Reference Books:

1. Microcomputer Systems: 8086/8088 family Architecture, Programming and Design: By Liu & Gibson (PHI Publication).

2. The INTEL Microprocessors, Architecture, Programming and Interfacing: By Barry B. Brey (PearsonPublishers, 8th Edition)

3. Microcontrollers: Architecture, Programming, Interfacing and System Design: By RajKamal, Pearson Education, 2005.

4. The 8051 Microcontroller Based Embedded Systems: By Manish K Patel, McGraw Hill, 2014.

5. Microcontroller Theory And Applications:By Ajay V Deshmukh, Tata Mcgraw Hill

List of experiments:

1. To convert different number from decimal to binary, octal to hexadecimal & vice versa &also study of logic gates.
2. Perform hands on experiment using 8086 kits.
3. Storing and displaying the content stored at different registers and memory location.
4. Implementation of 8086 programs involving data transfer and arithmetic instruction set.
5. Implementation of 8086 programs involving logical and bit manipulation instruction set.
6. Implementation of 8086 programs involving branch instruction and machine control instruction set.
7. Data transfer. - block move, exchange, sorting, finding largest element in an array.
8. Arithmetic instructions - addition/subtraction, multiplication, square & cube. (16 bits arithmetic operations)
9. Boolean & logical instructions (bit manipulations)
10. Programs to generate delay using serial port and on-chip timer / counter.
11. Simple calculator using six-digit seven segment display and hex keyboard interface to 8051.
12. Stepper and dc motor control interface to 8051

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

DISCRETE STRUCTURE & AUTOMATA THEORY

Course Details

Class	S. Y. B. Tech Sem - IV
Course Code and Course Title	PCC-ECS-405- Discrete structure & Automata Theory
Prerequisites	Engineering Mathematics I, II & III
Teaching scheme: Lecture /Practical/Tutorial	3/0/1
Credits	4
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: 01Hr/week	TW: NA
Practical: NA	ESE:NA

Course Objectives:

1. To cultivate clear thinking for Creative Problem Solving.

2. To train students to understand and construct Mathematical Proofs.

3. To introduce the notions of Sets, Relations, Functions, Graphs and their applications.

4. To build concepts of theoretical design of Basic machines, Deterministic and Non-Deterministic Finite and Pushdown Machines.

5. To gain the conceptual understanding of fundamentals of Grammars.

6. To prepare students with the mathematical aspects in other courses such as Formal Specification, Verification, Artificial Intelligence etc.

Course Outcomes:

After successful completion of the course students will be able to

1. Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving.

2. Reason Logically.

3. Perform operations with Sets, Relations, Functions, Graphs and their applications.

4. Design Deterministic Finite Automata (DFA) and Non-deterministic Finite Automata (NFA) and Pushdown Automata with understanding of power and limitations.

5. Design Context Free Grammar and perform the operations like simplification and normal forms.

6. Apply Discrete Structures and Automata Theory concepts into solving real world computing problems in the domain of Formal Specification, Verification, Artificial Intelligence etc.

Section-I

Unit		CONTENTS	Hours
1		**Set Theory and Logic**	7
	1.1	Set Theory: Fundamentals - Sets and Subsets, Venn Diagrams, Operations on sets, Laws of Set Theory, Power Set,.	
	1.2	Principle of Inclusion and Exclusion, Mathematical Induction.	
	1.3	Propositions and Logical operations, Truth tables, Equivalence, Implications	
	1.4	Laws of Logic, Normal Forms, Inference	
	1.5	Predicates and Quantifiers	
2		**Relations and Functions**	7
	2.1	Relations- Definition, Properties of Relations	
	2.2	Types of binary relations (Equivalence and partial ordered relations),	
	2.3	Closures, Poset, Hasse diagram and Lattice	
	2.4	Functions-Definition, Types of Functions (Injective, Surjective and Bijective)	
	2.5	Identity and Inverse Functions	
	2.6	Pigeonhole Principle, Extended Pigeonhole Principle	
3		**Graph Theory**	7
	3.1	Graphs and their basic properties - degree, path, cycle, subgraphs, Types of graphs.	
	3.2	Definitions, Paths and circuits: Eulerian and Hamiltonian, Planner Graph.	
	3.3	Isomorphism of graphs, Dijkstra Shortest Path Algorithm	
	3.4	Trees, Types of Trees	
Section-II			
4		**Finite Automata**	7
	4.1	Introduction of Automata and its applications	
	4.2	Deterministic Finite Automata (DFA) and Nondeterministic Finite Automata (NFA): Definitions, transition diagrams and Language recognizers, NFA to DFA Conversion.	
	4.3	Eliminating epsilon-transitions from NFA	
	4.4	FSM with output: Moore and Mealy machines	
5		**Regular Expression (RE) and Regular Grammar (RG)**	6
	5.1	Regular Grammar and Regular Expression (RE): Definition, Equivalence and Conversion from RE to RG and RG to RE.	
	5.2	Equivalence of RE and FA, Converting RE to FA and FA to RE.	
6		**Context Free Grammar (CFG) and Push Down Automata (PDA)**	8

	6.1	Grammars: Chomsky hierarchy, CFG- Definition, Sentential forms, Leftmost and Rightmost derivations	
	6.2	Context Free languages (CFL): Parsing and Ambiguity. CFLs: Simplification and Applications	
	6.3	Normal Forms: Chomsky Normal Form	
	6.4	PDA- Definition, Transitions (Diagrams, Functions and Tables), Design of PDA with Graphical Notation and Instantaneous Descriptions.	
		Total	**42**

Text Books:

1. Bernad Kolman, Robert Busby, Sharon Cutler Ross, Nadeem-ur-Rehman, "Discrete Mathematical Structures", Pearson Education.
2. C.L.Liu, "Elements of Discrete Mathematics", Second edition 1985, McGraw-Hill Book Company, Reprinted 2000.
3. John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, "Introduction to Automata Theory, Languages And Computation‖", Pearson Education.
4. Vivek Kulkarni, "Theory of Computation", Oxford University Press, India.

Reference Books:

1. K.H.Rosen, "Discrete Mathematics and applications", fifth edition 2003, Tata McGraw Hill publishing Company.
2. Y N Singh, "Discrete Mathematical Structures", Wiley-India.
3. J .L.Mott, A.Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians, second edition 1986, Prentice Hall of India.
5. J. P. Trembley, R. Manohar "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill.
6. Seymour Lipschutz, Marc Lars Lipson," Discrete Mathematics" Schaum's Outline, McGraw Hill Education.

6. Daniel I. A. Cohen," Introduction to Computer Theory", Wiley Publication.
7. Michael Sipser, "Theory of Computation", Cengage learning.
8. J. C. Martin, "Introduction to Languages and the Theory of Computation", Tata McGraw Hill.
9. Krishnamurthy E. V., "Introductory Theory of Computer Science", East-West Press.
10. Kavi Mahesh, "Theory of Computation: A Problem Solving Approach", Wiley-India.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

PROGRAMMING IN C++

Course Details

Class	S. Y. B. Tech Sem - IV
Course Code and Course Title	PCC-ECS-406- Programming in C++
Prerequisites	Computer Fundamentals
Teaching scheme: Lecture /Practical/Tutorial	2/1/0
Credits	3
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 50 Marks
Practical: 02Hrs/week	ESE: 50 Marks

Course Objectives:

The course aims to:

1 To understand features of object-oriented programming and design C++ classes

2 To understand how to overload functions and operators in C++.

3 To learn how to implement copy constructors and class member functions.

4 To learn how inheritance and virtual functions implement dynamic binding with polymorphism.

5 To learn how design inheritance for code reuse in C++.

6 To learn how to design and implement generic classes with C++ templates and exception handling

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1 Student will be able to understand the basic concepts of procedure-oriented programming language.

2 Student will be able to use the class, objects, function and operator overloading concepts

3 Student will be able to understand and implement the concept of inheritance, template and exception handling applications

4. Student will be able to design & apply the skills for solving the engineering problems.

Section I

Unit		CONTENTS	Hours
1		Introduction To Object Oriented Programming	4
	1.1	Difference between procedure-oriented programming and object-oriented programming	
	1.2	basic concepts and features of object-oriented programming	
	1.3	structures and classes, declaration of class, member functions	
	1.4	defining the object of class	
	1.5	accessing member of class, array of class objects.	
2		Overloading	4
	2.1	Function overloading	
	2.2	assignment operator overloading	
	2.3	binary operator overloading	
	2.4	unary operator overloading	
3		Constructors And Destructors	4
	3.1	Constructors- copy constructor	
	3.2	default constructors, destructors	
	3.3	inline member function	
	3.4	friend function, dynamic memory allocation.	
Section-II			
4		Polymorphism	4
	4.1	Polymorphism, early binding	
	4.2	polymorphism with pointers, virtual functions	
	4.3	late binding, pure virtual functions,	
	4.4	abstract base classes, constructor under inheritance	
	4.5	destructor under inheritance, virtual destructors, virtual base classes	
5		Inheritance	4
	5.1	Introduction, Single Inheritance	
	5.2	Types Of Base Classes- Direct, Indirect	
		Array Of Class Object and Single Inheritance, Multiple Inheritances.	
6		Template And Exception Handling	4
	6.1	Function template	
	6.2	class template	
	6.3	exception handling	
		Total	**24**

Text Books:

1 Programming with C++ D Ravichandran, II edition, Tata Mc Grow Hill

2 Object oriented Programming with C++, E Balagurusamy, Mc Grow Hill

Reference Books:

1 The C++ Programming Language, Brian W. Kernighan, Dennis M. Ritchi , IInd edition, Prentice Hall of India.

List of Experiments (Minimum 10 + mini project):

1. Develop a Program for implementation of array a) One-dimensional array b) multi-dimensional array 2. Develop a Program for implementation of classes and Objects.

3. Develop a Program for implementation of types of constructor a. Default constructor b. Parameterized constructor c. Copy constructor

4. Develop a Program for implementation of polymorphism

5. Develop a Program for implementation of Friend Functions in Class

6. Develop a Program for implementation of types of inheritance a. Single level Inheritance b. Multi-level Inheritance c. Multiple Inheritance d. Hybrid Inheritance e. Hierarchical inheritance

7. Develop an Object-oriented Program to Insert the Number in an Array

8. Develop an Object-oriented program to Delete the Number in an Array

9. Develop an Object-oriented program on Bubble Sort

10. Develop an Object-oriented program to Perform Linear or binary search

11. Develop an Object-oriented program to Insert and delete a Node in Link List

12. Develop an Object-oriented program to implement stack using linked list.

13. Mini project.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

ENVIRONMENTAL STUDIES

Course Details

Class	S. Y. B. Tech Sem - IV
Course Code and Course Title	MC-ECS-401- Environmental Studies
Prerequisites	Basic knowledge about natural process and fundamentals of environmental aspects
Teaching scheme: Lecture /Practical/Tutorial	2/0/1
Credits	3
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 02Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: 01Hr/week	TW: NA
Practical: NA	ESE: NA

Course Objectives:

The course aims to

1. To apply measures to Protect the environment, to maintain the quality of life
2. Environmental Education is important in conservation of natural resources and minimize or stops its over exploitation.
3. Design and evaluate strategies, technologies& methods for sustainable management of Environmental system and for the remediation or restoration of degraded environment
4. Social problems as well as social issues such as population explosion, exploitation on natural resources, Global warming, Acid rain, Ozone layer depletion, various natural disaster and its management, local level environmental problems, Water conservation, Environmental pollution and throws light on the methods of solution.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. To develop ability to protect the environment through ecofriendly lifestyle.
2. To give knowledge of natural resource conservation
3. To make able to implement sustainable technologies for environmental restoration.
4. To understand social issues and suggest solution

Unit		CONTENTS	Hours
1		**Nature of Environmental Studies.**	2
	1.1	Definition, Scope and Importance of Environment	
	1.2	Multidisciplinary nature of environmental studies	
	1.3	Need for public awareness.	
2		**Natural Resources and Associated Problems**	6
	2.1	Definition and Types of Natural Resources.	
	2.2	a) Forest resources: Use and over-exploitation, deforestation, dams' benefits and problems.	
	2.3	b) Water resources: Use and over-utilization of surface and ground Water, floods. Drought, conflicts over water.	
	2.4	c) Mineral resources: Usage and exploitation. Environmental effects of Extracting and using mineral resources.	
	2.5	D)Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer-pesticide Problems	
	2.6	E) Energy resources: Growing energy needs, renewable and nonrenewable Energy resources, use of alternate energy sources. Solar energy, Wind energy, Hydal energy, Tidal energy, Biomass energy, nuclear energy.	
	2.7	F) Land resources: Land as a resource, land degradation, man induced Landslide, Soil erosion. Role of individuals in conservation of natural resources	
3		**Ecology and Biodiversity**	10
	3.1	Concept of an ecosystem. Structure and function of ecosystem. - Producers, consumers and decomposers. Food chains, food webs. Energy flow in the ecosystem. Ecological pyramids. Ecological Succession. Introduction, types, characteristics features	
	3.2	structure and function of the following ecosystem a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes). d)Aquatic ecosystems (rivers, oceans, estuaries).	
	3.3	Introduction- Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India. Value of biodiversity	
	3.4	consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega- diversity nation	
	3.5	Hot Spots of Biodiversity. Endangered and Endemic Species of India	
	3.6	Threats to Biodiversity: - Habitat Loss, Poaching of Wildlife and Man-wild life Conflicts. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	
4		**Environmental Pollution**	6
	4.1	Definition: Causes, effects and control measures of: Air pollution Water pollution, Marine pollution, Soil Pollution	
	4.2	Noise pollution, Thermal Pollution, Nuclear hazards, Solid waste Management	
	4.3	Causes, effects and control measures of urban and industrial wastes Role of an individual in prevention of pollution.	
5		**Social Issues and the Environment**	7

	5.1	Disaster management: Floods, Earthquake, Cyclone Tsunami and Landslides. From Unsustainable to Sustainable Development.	
	5.2	Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns	
		Environmental ethics: Issue and possible solutions. Global warming acid rain, Ozone layer depletion Waste Land Reclamation.	
6		**Environmental protection and Environmental field work (mini project)**	9
	6.1	Environment Protection Act – 1986, Air (Prevention and Control of Pollution) Act. 1981	
	6.2	Water (Prevention and control of Pollution)	
	6.3	Forest Conservation Act. 1980. Act. Wildlife Protection Act. 1972 Environmental Field Project Report	
		Total	**24**

Text Books:

1. Dr. Jay Samant, "Environmental studies", Shivaji University, Kolhapur
2. Anubha Kaushik & C.P.Kaushik., "Perspectives in Environmental studies", New Age international Publisher, 2004.
3. Gouri Suresh, "Environmental studies & Ethics", I. K. International Publishing House, Pvt. Ltd.
4. Erach Barucha, "Environmental studies"

Reference Books:

1. Sharma B.K., "Environmental Chemistry", Goel Publication House, Meerut, 2001
2. Agarwal, K.C., "Environmental Biology", Nidi Pub. Ltd., Bikaner. 2001
3. Bharucha Erach, "The Biodiversity of India", Mapin Publishing Pvt. Ltd.
4. De A.K., "Environmental Chemistry", Wiley India. Western Ltd.
5. Rao M. N. and Datta, A.K., Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd., 345p. 1987
6. Trivedi R.K. and P.K. Gokel, "Introduction to air pollution", Tecgbi-Science Publications (TB)